

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 03 February 1998 (03.02.98)	
International application No. PCT/US97/10673	Applicant's or agent's file reference RD 25654
International filing date (day/month/year) 19 June 1997 (19.06.97)	Priority date (day/month/year) 21 June 1996 (21.06.96)
Applicant UTYASHEV, Farid Zainullaevich et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
12 January 1998 (12.01.98)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer P.Regis</p> <p>Telephone No.: (41-22) 338.83.38</p>
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PATENT COOPERATION TREATY

PCT**COMMUNICATION IN CASES FOR WHICH
NO OTHER FORM IS APPLICABLE**

From the INTERNATIONAL BUREAU

To:

CHASKIN, Jay, L.
General Electric Company
3135 Easton Turnpike W3C
Fairfield, CT 06431
ETATS-UNIS D'AMERIQUE

Date of mailing (<i>day/month/year</i>) 17 December 1997 (17.12.1997)	
Applicant's or agent's file reference RD 25654	REPLY DUE see paragraph 1 below
International application No. PCT/US97/10673	International filing date (<i>day/month/year</i>) 19 June 1997 (19.06.1997)
Applicant GENERAL ELECTRIC COMPANY	

1. ☐ REPLY DUE within _____ months/days from the above date of mailing
- ☐ NO REPLY DUE, however, see below
- ☒ IMPORTANT COMMUNICATION
- ☐ INFORMATION ONLY

2. COMMUNICATION:

The International Bureau regrets to inform the applicant that due to late receipt of the communication from the receiving Office concerning the confirmation of the precautionary designation of China (CN), the international publication of this application does not contain the designation.

Please be informed that a corrected version of the pamphlet, taking into account this designation will be published promptly.

Meanwhile, the International Bureau will communicate a copy of the international application to China (CN) as designated Office, in accordance with PCT Article 20.

A copy of this notification has been sent to the receiving Office (RO/US) and to the designated Office concerned (DO/CN).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Nicola Wolff
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT**NOTIFICATION REGARDING THE
CONFIRMATION OF PRECAUTIONARY
DESIGNATIONS**

(PCT Rule 24.2(a), last sentence)

From the INTERNATIONAL BUREAU

To:

CHASKIN, Jay, L.
General Electric Company
3135 Easton Turnpike W3C
Fairfield, CT 06431
ETATS-UNIS D'AMERIQUE

Date of mailing (<i>day/month/year</i>) 17 December 1997 (17.12.1997)		
Applicant's or agent's file reference RD 25654		IMPORTANT NOTIFICATION
International application No. PCT/US97/10673	International filing date (<i>day/month/year</i>) 19 June 1997 (19.06.1997)	Priority date (<i>day/month/year</i>) 21 June 1996 (21.06.1996)
Applicant GENERAL ELECTRIC COMPANY		

1. The applicant is hereby notified that, pursuant to the confirmation of precautionary designations, the following designated Offices will also be notified of the receipt of the record copy by the International Bureau:

List of designated Offices :
National: CN

Name(s) of applicant(s) for
the designated States concerned : GENERAL ELECTRIC COMPANY et al

2. This notification complements the Notification of Receipt of Record Copy (Form PCT/IB/301).
3. The applicant is reminded that:
- (i) the data appearing above, and especially the (list of) designation(s) should be carefully checked;
 - (ii) the time limits for entering the national phase in the designated Offices must be monitored by the applicant (see the Annex to Form PCT/IB/301).
4. A copy of this notification is being sent to the receiving Office.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Nicola Wolff
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

CHASKING, Jay L.
General Electric Company
International Patent Operation
3135 Easton Turnpike Mail Drop W3C
Fairfield, Connecticut 06431-0001
ETATS-UNIS D'AMERIQUE

COMMUNICATION IN CASES FOR WHICH
NO OTHER FORM IS APPLICABLE

Date of mailing
(day/month/year)

11.09.98

Applicant's or agent's file reference
RD25654

REPLY DUE
See paragraph 1 below

International application No.

PCT/US 97/10673

International filing date (day/month/year)

19/06/1997

Applicant

GENERAL ELECTRIC COMPANY et al.

1. ☐ REPLY DUE within _____, months/days from the above date of mailing

☒ NO REPLY DUE

2. COMMUNICATION:

Ref = 01 Report 01-09-98
According to Mrs Schmidt (Formality Officer by WIPO)
it is necessary to correct the joint "Basis of the
Report", especially under "Claims" and
"Drawings, sheets".

Please find hereunder a copy for your file.

PJ = 1

Name and mailing address of the IPEA:



European Patent Office
D-80298 Munich
Tel. (+49-89) 2399-0, Tx: 523656 epmu d
Fax: (+49-89) 2399-4465

Authorized officer

Annelie Möller

Telephone No.

2399-8222

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US97/10673

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1- 33 as originally filed

Claims, No.:

2- 12, 14, 15, 16(*part*) as originally filed
17- 30

1, 13, 16(*part*) as received on 25/06/1998 with letter of 23/06/1998

Drawings, sheets:

1/11- 11/11 . *as originally filed*
~~filed with the demand~~

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference RD25654	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 97/ 10673	International filing date (day/month/year) 19/06/1997	(Earliest) Priority Date (day/month/year) 21/06/1996
Applicant GENERAL ELECTRIC COMPANY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:

Figure No. 1 ☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B21H1/04 C22F1/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B21H C22F B21K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KOPPERS U: "FLEXIBLES WALZEN VON RINGEN MIT PROFILQUERSCHNITT. ANWENDUNGEN FLEXIBLE ROLLING OF RINGS WITH PROFILED CROSS SECTIONS" UMFORMTECHNIK, vol. 27, no. 1, pages 35-38, XP000336352 see page 38, left-hand column, line 7 - middle column, line 36; figures 2-5 ---	1-3,5-7, 13,24-30
A	DATABASE WPI Section Ch, Week 9342 Derwent Publications Ltd., London, GB; Class M21, AN 93-335386 XP002043473 & SU 1 770 014 A (TANTAL CONS BUR UFA AVIATION INST) , 23 October 1992 see abstract --- -/-	1,13, 24-30



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

14 October 1997

Date of mailing of the international search report

31 10 97

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Plastiras, D

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 016, no. 020 (C-0902), 20 January 1992 & JP 03 236452 A (SUMITOMO METAL IND LTD), 22 October 1991, see abstract ---	1,13, 24-30
A	DATABASE WPI Section PQ, Week 8047 Derwent Publications Ltd., London, GB; Class P52, AN 80-L3029C XP002043474 & SU 727 287 A (DNEPR FERR METAL) , 25 April 1980 see abstract ---	1,13, 24-30
A	DATABASE WPI Section Ch, Week 8936 Derwent Publications Ltd., London, GB; Class M21, AN 89-261741 XP002043475 & SU 1 442 310 A (FERROUS METALLURGY INST) , 7 December 1988 see abstract ---	1,13, 24-30
A	DATABASE WPI Section Ch, Week 9526 Derwent Publications Ltd., London, GB; Class M22, AN 95-198402 XP002043476 & RU 2 022 710 C (AS USSR METAL SUPER-PLASTICITY PROBLEMS ET AL) , 15 November 1994 see abstract -----	1,13, 24-30

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 03 SEP 1998

WIPO

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Applicant's or agent's file reference RD25654	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (PCT/IPEA/416)	
International application No. PCT/US97/10673	International filing date (day/month/year) 19/06/1997	Priority date (day/month/year) 21/06/1996
International Patent Classification (IPC) or national classification and IPC B21H1/04		
Applicant GENERAL ELECTRIC COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 12/01/1998	Date of completion of this report 1. 09. 98
Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0. Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer Rechler, W Telephone No. (+49-89) 2399-2354 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US97/10673

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-33 as originally filed

Claims, No.:

2-12,14,15,16(part) as originally filed
17-30

1,13,16(part) as received on 25/06/1998 with letter of 23/06/1998

Drawings, sheets:

1/11-11/11 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/US97/10673

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1 - 24
	No:	Claims	25-30
Inventive step (IS)	Yes:	Claims	1 - 24
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1 - 30
	No:	Claims	

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US97/10673

Section V:

1. The relevant prior art is indicated on pages 1 and 2 of the description. There is no document of particular relevance available.
2. The problem to be solved by the present invention was to provide a method for producing large axially symmetric parts from hard-to-work multiphase alloys with increased efficiency (see page 2, line 29 to page 3, line 5).

This problem is solved by the combination of features set out in the independent claims 1 and 13, especially by the temperature and mechanical conditions defined in these claims.

3. The present invention shall be considered to be new because no cited prior art document discloses all features of independent claims 1 or 13 in combination.
4. The cited documents do not disclose the essential subject-matter concerning the billet temperature being above 0.4 times the temperature of the melting point and the defined mechanical conditions including the load of the tool rollers being in a defined range depending on the material of the workpiece. The available prior art documents do not give the skilled person any lead to provide this subject matter at known methods and to combine all features defining the invention according to independent claims 1 and 13.
5. The invention shall be considered as susceptible of industrial application because it can be made or used in the metal processing industry.
6. Claims 2 - 12 and 14 - 24 are dependent on claims 1 or 13, respectively, and as such also meet the requirements of the PCT with respect to novelty and inventive step.
7. A product is not rendered novel merely by the fact that it is produced by means of a new process, but must fulfil the requirements of novelty and inventive step as such. In the present case, since the independent claims 25 and 28 do not contain any features defining the claimed parts, these parts cannot be considered to be novel in the sense of Article 33 (2) PCT. Parts made from a superalloy material

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US97/10673

are also known to the skilled person. Thus, the subject matter of claims 26 and 29 is also not new. The same is true for the subject matter of dependent claims 27 and 30, since the mentioned alloys are known in the art and, consequently, also parts made from these alloys.

Section VIII:

1. The various definitions of the invention given in independent claims 1 and 13 are such that the claims as a whole are not clear and concise, so that Article 6 PCT is not met. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the twofold of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought and whether one or two different inventions are claimed, and places an undue burden on others seeking to establish the extent of the protection.
2. The last feature of independent claims 1 and 13, i.e. the feature "heating the part to a temperature above or below a ... temperature ... depending on a microstructure ..." does not limit the claims in any way, because any temperature is above or below a second temperature, if it is not identical, and it is completely left open which kind of microstructure shall result in the part being heated to which temperature.
3. The independent claims 25 and 28 do not contain any features. These claims merely state that a product is obtainable from any of the processes according to claims 1 and 13.

What is claimed:

1. A method for producing axially symmetric parts from multiphase alloys, comprising the following steps:
- shaping an axially symmetric billet of the part being produced by rolling of said billet, while rotating about its own axis, with at least
- 5 one roll which has at least three degrees of freedom, under controlled temperature and mechanical conditions, at a billet temperature above 0.4 m.p. of the multiphase alloy but below a temperature at which a total content of precipitates or an allotropic modification of the matrix of a multiphase alloy is not below about 7%, with a tool load q of said
- 10 roller, meeting the following conditions:

$$\sigma_{SH} > q \geq \sigma_{SA}$$
$$K \cdot \sigma_{SH} > q$$

where σ_{SA} - yield stress of the material of the billet portions subjected to deformation;

- 15 σ_{SH} - strain resistance of the material of the billet portions not subjected to deformation;

σ_{SH} - strain resistance of the tool material at a strain temperature of the billet under process;

$$K \leq 2,$$

- 20 with the strain rate in the range from about 10^2 to about 10^{-3} s^{-1} ; and then

- heating the part to a temperature above or below a dissolution temperature of a second phase or allotropic modification depending on a microstructure of the material of the axially symmetric part resulting
- 25 from the rolling procedure.

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10. A method as set forth in claim 1, wherein rolling is performed with an increased speed of radial roll displacement away from the disk axis.

11. A method as set forth in claim 1, wherein intricate-shaped parts are rolled with at least three rolls whose axes can rotate in the range of from about 0 to 1 radian with respect to the axis of the billet rotation and make up an angle of from about 0 to 2π radian with
5 the axes of other rolls.

12. A method as set forth in claim 1, wherein the billet is rolled with rolls displaced with respect to the plane passing through the billet axis.

13. A method for producing axially symmetric parts from multiphase alloys, comprising the following steps:

(a) preparing the billet structure by a thermo-mechanical treatment, comprising heating the billet to a temperature at which a
5 total content of precipitates or an allotropic modification of the matrix exceeds about 7%, followed by stage-by-stage reduction of the treatment temperature down to a temperature of formation of a stable fine-grained microstructure, the ratio between the grain sizes of different phases not exceeding 10;

10 (b) subjecting the billet to deformation at each decreasing temperature stage so as to reduce a billet cross-sectional area by about 1.2 to 3.9 times per stage;

(c) further subjecting the billet to deformation while rotating the billet round its own axis, by rolling it with at least one roll which has at
15 least three degrees of freedom, under controlled temperature and mechanical conditions, at a billet temperature above 0.4 m.p. of the multiphase alloy but below a temperature at which a total content of precipitates or precipitated phases or an allotropic modification of the matrix of a multiphase alloy is not below 7%, with a tool load q of said
20 roller meeting the following conditions:

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$$\sigma_{SH} > q \geq \sigma_{SA}$$

$$K \cdot \sigma_{S\eta} > q$$

where σ_{SH} - strain resistance of the material of the billet portions
25 not subjected to deformation;

σ_{SA} - yield stress of the material of the billet portions subjected to
deformation;

$\sigma_{S\eta}$ - strain resistance of the tool material at a strain temperature
of the billet under process;

30 $K \leq 2$, empirical coefficient

with the strain rate in the range from about 10^2 to about 10^{-3} s^{-1} ; and then

(d) heating the part to a temperature above or below the
dissolution temperature of the second phase or allotropic modification
35 depending on the microstructure of the material of the axially
symmetric part resulting from the rolling procedure.

14. A method as set forth in claim 13, wherein the billet is
imparted, at step (a) of preparing the billet structure, the shape
corresponding to that of the axisymmetrical part produced.

15. A method as set forth in claim 13, wherein a stage-
by-stage reduction of the treatment temperature of the billet from
nickel-base alloys is performed by providing a maximum increase in
the amount of the γ' -phase at each stage up to and including about
5 14%, and each stage of the thermomechanical treatment is followed
by a post-deformation annealing at a temperature not exceeding the
temperature of the beginning of deformation at a preceding stage of
treatment.

16. A method as set forth in claim 13, wherein the strain
rate at the first treatment stage ranges from 10^{-2} to 10^{-3} s^{-1} , and the
strain rate at the following stages is in accordance with the following
relationship: